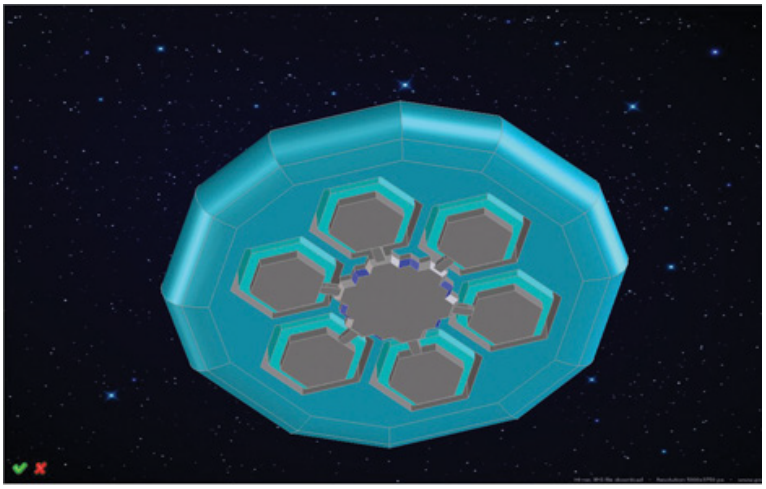
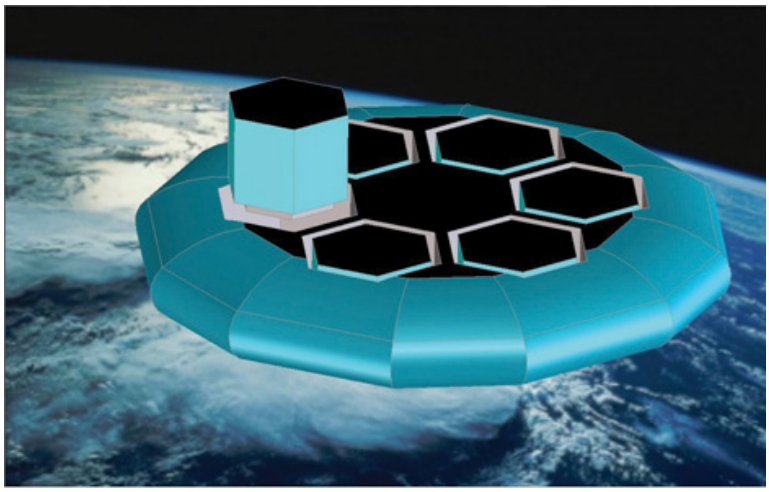
Multibody Advanced Airship for Transport (MAAT) project





The Multibody Advanced Airship for Transport (MAAT) project, which gathers engineers and researchers with a wide range of specialties from Italy, the UK, Russia, Germany, Belgium, Portugal and Paraguay. The project envisages a 'cruiser' ship flying at high altitude for long periods (perhaps indefinitely) on a fixed route, along which are set exchange points where feeder or daughter craft take off from the ground and dock with the cruiser.

Prof Paul Stewart of Lincoln University is leading the UK's contribution to the project, which focuses on the electrical power systems, energy storage, propulsion and control systems used for flight. His background is in tradition civil aviation, specifically designing electrical power solutions to replace conventional hydraulics for the next generation of airliners. The MAAT project is rated as TRL-1, but actually evolved from an earlier project called PSICHE (Photovoltaic Stratospheric Isle for Conversion in Hydrogen as Energy vector).

The sketches they came up with involved a lenticular-shaped cruiser airship measuring 350m in diameter and 70m in height at the deepest centre point, capable of flying at speeds of around 300km/h at an altitude of 15,600m. This cruiser ship had a total capacity of around 500 passengers and included spaces for six feeder crafts to dock in a flower arrangement around the centre.

The MAAT collaborators envisage a scenario where there are 12 feeder craft (six on the ground and six joined to the cruiser). The cruiser ship will arrive with people and goods at an interception point and the feeder containing them will be released and will descend to land at an airport hub – from which another feeder with people and goods will have previously taken off to be boarded on the cruiser.

After reaching the operational altitude of the cruiser ship, the feeder approaches and engages in the place vacated by the descending feeder using aerostatic lift and thrust vectoring. The complete MAAT system will proceed to the next interception point, where the unloading/loading procedure will be repeated. In terms of safety, if some of the ballonets were to fail, the buoyancy system would not be irremediably damaged and the cruiser ship could safely reach lower altitudes (some thousands of meters) with a fall speed much lower than that of any aircraft encountering problems.

'This lenticular shape… some of us have tried it before and it's grossly unstable,' one member said. The problem, apparently, is that lenticular airships start to list from side to side, eventually entering oscillating limit cycle. One airship engineer, Dr Edwin Mowforth, experimented with lenticular airships in the 1980s with the now defunct British company Airship Industries. The concept was eventually dropped, with Mowforth publishing some calculations suggesting it was all but impossible to control.
Another problem facing the MAAT project is that at high altitude the air is far less dense and therefore it's difficult for conventional propellers, even at high speed, to grasp enough air to get the reactive forces needed for forward propulsion.